

What is claimed is:

CLAIMS

1. A line balance correction device for correcting longitudinal balance of a copper pair, the device is adapted to be connected in parallel to the copper pair and to a local ground, and comprising:
 - a controller; and
 - at least one variable resistor for connecting to each wire of the copper pair, wherein the resistance of each said at least one variable resistor is independently controlled by said controller for matching, at least up to an acceptable resistance difference level, resistance of signals carried over a corresponding wire of the copper pair to the local ground.
2. The device of claim 1 and also comprising:
 - at least one current source for connecting to each wire of the copper pair, each said at least one current source being independently controlled by said controller for providing at least one cancellation signal for reducing at least one of the following: common-mode noise; and differential signal imbalance.
3. The device of claim 1 and also comprising:
 - at least one voltage detector operatively associated with said controller for enabling said controller to compute at least one of the following: a line imbalance; and common-mode noise versus differential signal imbalance.
4. The device of claim 2 and also comprising:
 - at least one voltage detector operatively associated with said controller for enabling said controller to compute at least one of the following: a line imbalance; and common-mode noise versus differential signal imbalance.

5. The device of claim 3 and wherein said at least one voltage detector comprises at least one of the following: at least one root-mean-square (RMS) voltage detector; at least one peak voltage detector; and an xDSL signal type detector.
6. The device of claim 3 and also comprising a band-pass filter operatively associated with said at least one voltage detector, the band-pass filter being programmable throughout a frequency band of an xDSL transmission and operative to output band-limit signals to said at least one voltage detector.
7. The device of claim 5 and wherein said at least one voltage detector provides to said controller at least one of the following: an RMS value of a signal carried on a Tip wire of the copper pair; an RMS value of a signal carried on a Ring wire of the copper pair; a peak value of a signal carried on a Tip wire of the copper pair; and a peak value of a signal carried on a Ring wire of the copper pair.
8. The device of claim 5 and wherein said at least one RMS voltage detector comprises at least one RMS voltage detector for each wire of the copper pair.
9. The device of claim 5 and wherein said at least one peak voltage detector comprises at least one peak voltage detector for each wire of the copper pair.
10. The device of claim 3 and also comprising a programmable switch operatively controlled by said controller for enabling said at least one voltage detector to selectively detect one of the following: an RMS voltage of a signal carried on a Tip wire of the copper pair; an RMS voltage of a signal carried on a Ring wire of the copper pair; a peak voltage of a signal carried on a Tip wire of the copper pair; and a peak voltage of a signal carried on a Ring wire of the copper pair.

11. The device of claim 1 and also comprising a power supply operative to supply electric power to active components of the device.
12. The device of claim 1 and also comprising:
an xDSL signal type detector operatively associated with said controller for enabling said controller to compute common-mode noise versus differential signal imbalance.
13. The device of claim 2 and also comprising:
an xDSL signal type detector operatively associated with said controller for enabling said controller to compute common-mode noise versus differential signal imbalance.
14. The device of claim 12 and wherein said xDSL detector is operative to provide at least one differential-mode component for enabling the controller to compute at least one peak voltage-to-RMS voltage ratio for analyzing common-mode noise versus differential signal imbalance.
15. The device of claim 1 and wherein said device corrects longitudinal balance of a copper pair carrying one of the following: unidirectional signals; and bi-directional signals.
16. A line balance correction device for correcting longitudinal balance of a copper pair, the device being adapted to be connected in parallel to the copper pair and to a local ground, the device comprising:
a controller; and
at least one current source for connecting to each wire of the copper pair, each said at least one current source being independently controlled by said

controller for providing at least one cancellation signal for reducing at least one of the following: common-mode noise; and differential signal imbalance.

17. A line balance correction device for correcting longitudinal balance of a copper pair, the device being adapted to be connected in parallel to the copper pair and to a local ground, the device comprising:

a controller; and

at least one voltage detector operatively associated with said controller for enabling said controller to compute at least one of the following: a line imbalance; and common-mode noise versus differential signal imbalance.

18. A line balance correction device for correcting longitudinal balance of a copper pair, the device being adapted to be connected in parallel to the copper pair and to a local ground, the device comprising:

a controller;

at least one voltage detector operatively associated with said controller and operative to enable said controller to compute at least one of the following: a line imbalance; and common-mode noise versus differential signal imbalance;

a band-pass filter operatively associated with said at least one voltage detector, the band-pass filter being programmable throughout a frequency band of an xDSL transmission and operative to output band-limit signals to said at least one voltage detector;

at least one variable resistor for connecting to each wire of the copper pair, wherein the resistance of each said at least one variable resistor is independently controlled by said controller for matching, at least up to an acceptable resistance difference level, resistance of signals carried over a corresponding wire of the copper pair to the local ground;

at least one current source for connecting to each wire of the copper pair, each said at least one current source being independently controlled by said

controller for providing at least one cancellation signal for reducing at least one of the following: common-mode noise; and differential signal imbalance; and a power supply operative to supply electric power to active components of the device.

19. An xDSL transmission system comprising:
an xDSL Transceiver Unit central office (xTU-C);
an xDSL Transceiver Unit remote unit (xTU-R);
a copper pair operatively associating said xTU-C with said xTU-R;
and
the device of claim 1.

20. An xDSL transmission system comprising:
an xDSL Transceiver Unit central office (xTU-C);
an xDSL Transceiver Unit remote unit (xTU-R);
a copper pair operatively associating said xTU-C with said xTU-R;
and
the device of claim 16.

21. An xDSL transmission system comprising:
an xDSL central office transmission unit (xTU-C);
a remote xDSL transmission unit (xTU-R);
a copper pair operatively associating said xTU-C with said xTU-R;
and
the device of claim 17.

22. A method for correcting longitudinal balance of a copper pair, the method comprising:

sensing resistance of each wire of said copper pair; and independently controlling said resistance of each wire of said copper pair for matching, at least up to an acceptable resistance difference level, resistance of signals carried over a corresponding wire of the copper pair to a local ground.

23. A method for correcting longitudinal balance of a copper pair, the method comprising:

computing at least one of the following: common-mode noise on the copper pair; and differential signal imbalance on the copper pair; and

providing at least one cancellation signal for respectively reducing at least one of the following: said common-mode noise; and said differential signal imbalance.

24. A method for correcting longitudinal balance of a copper pair, the method comprising:

detecting, for each wire of said copper pair, at least one of the following: a RMS voltage; and a peak voltage; and

using at least one of said RMS voltage and said peak voltage to compute at least one of the following: a line imbalance; and common-mode noise versus differential signal imbalance.